Trend Study 16C-28-04

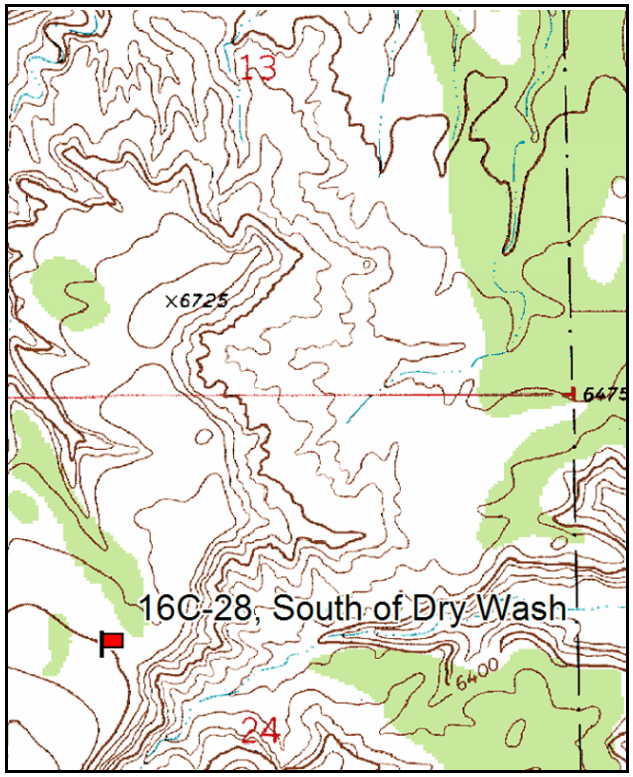
Study site name: South of Dry Wash . Vegetation type: Chained, Seeded P-J .

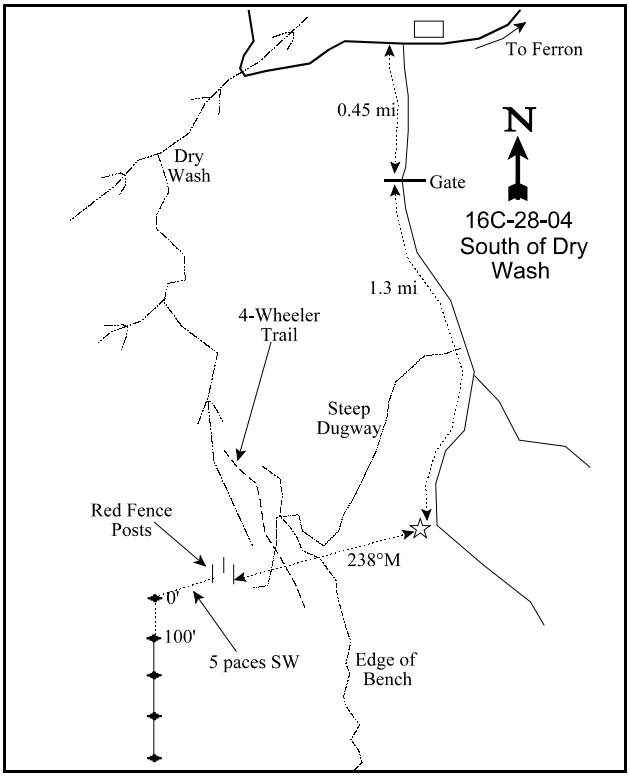
Compass bearing: frequency baseline 170 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the town of Ferron, proceed west up Canyon Road for 3.7 miles. 300 ft after the entrance to Millsite Golf Course, turn left onto a dirt road. Go south on the dirt road 0.45 miles to a gate. Continue 1.3 miles to a witness post on F.S. Road #118. From the witness post, walk up the ridge to the west. There is a game trail going to the top at a bearing of 238°M. Take this trail southwest along the edge of the chained area. The road continues up into the east edge of the chaining, where FS photo study plots and the trend study are located. The FS study is marked by tall red fenceposts. The range trend study, marked by 2 foot fenceposts, is adjacent.





Map Name: Ferron

Diagrammatic Sketch

Township 20S , Range 6E , Section 24

GPS: NAD 27, UTM 12S 4323868 N, 482672 E

DISCUSSION

South of Dry Wash - Trend Study No. 16C-28

This trend study samples a chaining on a bench below Nelson Mountain, south of Dry Wash. The 35 acre chaining and seeding was done in 1972 as a Forest Service wildlife habitat enhancement project. This study site is on a north aspect with a gently slope (5-7%) at 6,800 feet. A rather isolated site, it receives little use by cattle. It produces an abundance of quality forage for wintering big game and appears to be used into the spring by deer. Pellet group data from 1999 estimated 85 deer and 11 elk days use/acre (209 ddu/ha and 27 edu/ha). Pellet group data from 2004 estimated 41 deer and 8 elk days use/acre (20 edu/ha and 101 ddu/ha). Most of the deer pellet groups were from winter use but about 35% of the deer pellet groups encountered appeared to be from spring use.

The site is on a gentle slope (7%) with a slight north aspect and an elevation of 6,800 feet. Effective rooting depth is estimated at 13 inches, although at about 4 inches in depth a compacted soil horizon is encountered which contains a lot of clay. The soil surface and profile are very rocky. Overall, soil texture is a sandy clay loam with a slightly alkaline pH (7.5). Phosphorus and potassium are low at only 3 ppm and 38.4 ppm respectively. Values less than 10 ppm for phosphorus and 70 ppm for potassium can limit normal plant growth and development. Even with the gentle slope, there is a fair amount of soil movement. This erosion causes gullies, sedimentation, and concentrations of erosion pavement in open areas.

Black sagebrush is the most numerous browse species with a steadily increasing population of 3,440 plants/acre estimated in 1994, 3,800 in 1999 and 4,280 by 2004. It provided 32% of the browse cover in 1994, 34% in 1999, and 35% in 2004. These low growing shrubs were moderately to heavily hedged in 1994, while use was light to moderate in 1999 and 2004. Vigor is generally good but many decadent plants sampled in 1994, 1999, and 2004 appeared to be dying.

True mountain mahogany is also fairly abundant and produces additional valuable forage. It produced 34% of the browse cover in 1994, 33% in 1999, and 29% in 2004. The population was estimated at 600 plants/acre in 1999 increasing to 720 plants/acre in 2004. Mature mahogany averages 4 to 5 feet in height. Available portions of these shrubs show moderate to heavy use. Vigor is good and percent decadence low. Green ephedra is another palatable shrub found on the sight. It has been moderately hedged and has good vigor.

Other palatable browse include four-wing saltbush and slender buckwheat. Released pinyon and juniper trees are abundant and provide about one-third of the browse cover. Total canopy cover was estimated at 13 percent in 2004 and point-center quarter data estimated a density of 156 pinyon and 144 juniper trees/acre. Average diameter of pinyon was estimated at 2.4 inches while that of juniper was 3.4 inches. About one-third of the juniper trees sampled were knocked down by the chaining but still living. The knocked down juniper trees had an average diameter of nearly 8 inches.

The herbaceous understory is not very abundant. The most common grass is the native Indian ricegrass. It provided 77% of the grass cover in 1994, 79% in 1999, and 50% in 2004. Individuals were very robust and vigorous in 1999, with mature plants as tall as 17 inches. Salina wildrye, a bunchgrass that is slightly rhizomatous, is present but not abundant. Forbs are rare, typically small, and don't offer much forage or cover.

1994 TREND ASSESSMENT

Litter cover has decreased but still provides moderate cover for the soil. There is a decrease in rock and pavement cover. Relative percent bare ground has remained almost the same. Sixty-seven percent of the vegetative cover is provided by browse and 30% of the browse cover is from pinyon and juniper trees which

do not provide as much soil protection as cover of herbaceous plants. However, the soil trend is considered stable. Black sagebrush shows an increasing mature population and an increasing decadency rate. True mountain mahogany also shows an increasing mature population, but a decreasing rate of decadency. Both species currently have poor recruitment. Browse trend is still considered stable. Herbaceous understory trend is stable as well. Sum of nested frequency for perennial grasses has remained constant, while perennial forb nested frequency has declined only slightly. However, perennial forbs only contribute to only about 15% of the herbaceous cover. The only down side to the trend is the significant decrease in Indian ricegrass combined with the appearance of Salina wildrye, not a preferred forage species. The increased sample size taken in 1994 may be responsible for these changes. The new lengthened baseline likely picked up some Salina wildrye which was formally outside the study area. Forbs combined provide just over 1% cover and have slightly decreased in nested frequency. They provide little forage and are not an important aspect of the vegetative composition. The Desirable Components Index (see methods) rated this site as fair with a score of 61 due to good shrub cover, several young shrubs, and moderate grass cover, but low forb cover.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 61 (fair) Black big sagebrush type - chaining

1999 TREND ASSESSMENT

The soil trend is up slightly. Relative percent cover for bare ground has declined from 23% to 16% and litter cover has increased slightly from 36% to 40%. However, there is still some erosion occurring. Trend for browse is up slightly for the key species black sagebrush. Density has increased slightly, use is lighter, recruitment improved, and percent decadence has declined from 30% to only 17%. True mountain mahogany shows a stable trend. The only negative aspect to the browse trend is the increase in cover of released pinyon and juniper trees that escaped the chaining treatment. Trend for the herbaceous understory is stable but still limited in productivity. Sum of nested frequency for perennial grasses increased slightly, but not enough to warrant an upward change in trend. There was a significant increase in the nested frequency of Indian ricegrass. Nested frequency for perennial forbs declined although they were never very abundant. The Desirable Components Index rated this site as good with a score of 69 due to good shrub cover, increase in young shrubs, and moderate grass cover, but low forb cover.

TREND ASSESSMENT
soil - up slightly (4)
browse - up slightly (4)
herbaceous understory - stable (3)
winter range condition (DC Index) - 69 (good) Black big sagebrush type - chaining

2004 TREND ASSESSMENT

Trend for soil is slightly down. Relative percent cover for bare ground has increased from 16% to 24% and litter cover declined 6%. There is some localized erosion occurring but it is minimal due to the gentle terrain. The soil erosion condition assessment rated soil as stable. Trend for the key browse species, black sagebrush and true mountain mahogany, is slightly up. Density of both populations has increased, vigor has remained good, and decadence is relatively low. One negative aspect of the browse trend is the abundance of pinyon and juniper trees which have steadily increased in cover. Total canopy cover was estimated at 13% in 2004. When pinyon-juniper canopy cover starts approaching 15%, it starts to exhibit its negative effect on the herbaceous understory. About 60% of the juniper and 65% of the pinyon trees are small trees 1 to 4 foot in height released by the chaining. A continued increase in canopy cover will suppress understory species. The

herbaceous understory is poor, producing only about 4% total cover in 2004. Trend is down slightly. Sum of nested frequency of perennial grasses declined slightly but frequency of Indian rice grass, which is the most abundant species in the understory, declined significantly. The forb composition is diverse but all species are rare in the occurrence. Drought conditions are likely responsible for the decline in perennial grass abundance and cover and a downward soil trend. A return to normal precipitation patterns will likely reverse this trend. The Desirable Components Index rated this site as fair with a score of 60 due to good shrub cover, several young shrubs, and a decrease in grass cover.

TREND ASSESSMENT
soil - slightly down (2)
browse - up slightly (4)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 60 (fair) Black big sagebrush type - chaining

HERBACEOUS TRENDS --
Management unit 16C, Study no: 28

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	4	5	1	13	.03	.00	.10
G	Bromus tectorum (a)	-	-	-	1	-	-	.00
G	Elymus junceus	-	-	-	6	-	-	.45
G	Elymus salina	$_{a}$-	$_{c}$34	$_{b}$30	$_{b}$10	1.88	1.61	1.07
G	Oryzopsis hymenoides	$_{b}$116	$_{a}$84	$_{ab}$113	$_{a}$79	7.11	6.82	1.72
G	Sitanion hystrix	$_{b}$20	$_{ab}$17	$_{ab}$17	$_{a}$7	.19	.16	.08
Total for Annual Grasses		0	0	0	1	0	0	0.00
Total for Perennial Grasses		140	140	161	115	9.22	8.61	3.44
Total for Grasses		140	140	161	116	9.22	8.61	3.44
F	Artemisia ludoviciana	-	3	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	-	-	7	-	-	.01
F	Cryptantha spp.	$_{ab}$45	$_{b}$52	$_{ab}$29	$_{a}$19	1.48	.42	.12
F	Descurainia pinnata (a)	-	-	3	2	-	.00	.00
F	Eriogonum ovalifolium	4	6	2	-	.01	.01	-
F	Gilia spp. (a)	-	3	-	5	.00	-	.01
F	Lepidium spp. (a)	-	-	5	5	-	.06	.22
F	Machaeranthera canescens	2	-	-	-	-	-	-
F	Penstemon carnosus	$_{b}$23	$_{a}$9	$_{a}$3	$_{a}$2	.02	.01	.00
F	Phlox austromontana	4	-	-	-	-	-	-
F	Schoencrambe linifolia	$_{a}$-	$_{a}$-	$_{a}$2	$_{b}$12	-	.00	.03
F	Thelypodiopsis saggittata	12	5	-	-	.01	-	.00
F	Thelesperma subnudum	$_{b}$14	$_{a}$2	$_{a}$-	$_{a}$2	.00	-	.00
F	Townsendia incana	$_{a}$3	$_{a}$3	$_{a}$-	$_{b}$19	.00	-	.10

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
Total for Annual Forbs		0	3	8	19	0.00	0.06	0.24
Total for Perennial Forbs		107	80	36	54	1.55	0.44	0.27
Total for Forbs		107	83	44	73	1.55	0.50	0.51

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 16C, Study no: 28

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia nova	69	74	73	7.10	8.23	10.03
B	Cercocarpus montanus	26	26	32	7.46	7.96	8.09
B	Chrysothamnus nauseosus	2	0	0	-	-	-
B	Chrysothamnus viscidiflorus	0	1	0	-	-	-
B	Ephedra viridis	15	15	13	.78	.96	2.11
B	Eriogonum microthecum	21	15	20	.02	.01	.03
B	Gutierrezia sarothrae	0	0	1	-	-	-
B	Juniperus osteosperma	0	8	8	1.58	2.04	3.14
B	Opuntia polyacantha	4	4	3	.03	.18	.18
B	Pinus edulis	0	13	10	4.87	5.03	4.67
Total for Browse		137	156	160	21.87	24.42	28.27

CANOPY COVER, LINE INTERCEPT --
Management unit 16C, Study no: 28

Species	Percent Cover	
	'99	'04
Artemisia nova	-	8.64
Cercocarpus montanus	3.40	9.21
Ephedra viridis	-	2.29
Juniperus osteosperma	-	4.26
Pinus edulis	-	8.69

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 28

Species	Average leader growth (in) '04
Artemisia nova	1.3
Cercocarpus montanus	4.3

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 28

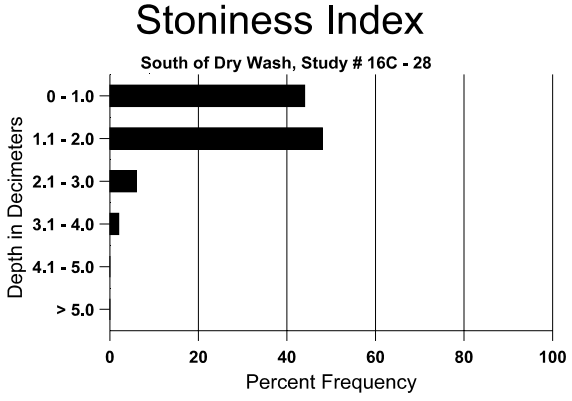
Species	Trees per Acre '99	Trees per Acre '04	Average diameter (in) '99	Average diameter (in) '04
Juniperus osteosperma	108	144	3.3	3.4
Pinus edulis	185	156	2	2.4

BASIC COVER --
Management unit 16C, Study no: 28

Cover Type	Average Cover % '88	'94	'99	'04
Vegetation	2.25	29.27	32.51	31.79
Rock	6.00	10.97	8.50	8.25
Pavement	16.25	4.17	12.60	9.40
Litter	52.00	39.35	48.24	40.99
Cryptogams	.25	.16	.75	.48
Bare Ground	23.25	24.50	19.09	28.55

SOIL ANALYSIS DATA --
Management unit 16C, Study no: 28, Study Name: South of Dry Wash

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
13.1	66.0 (11.5)	7.5	54.7	21.4	23.8	3.9	3.0	38.4	0.7



PELLET GROUP DATA --
Management unit 16C, Study no: 28

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	17	18	19
Elk	-	6	8
Deer	34	27	24

Days use per acre (ha)	
'99	'04
-	-
11 (27)	8 (20)
85 (209)	41 (101)

BROWSE CHARACTERISTICS --
Management unit 16C, Study no: 28

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Amelanchier utahensis												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	6/7
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia nova												
88	**2332**	233	833	1233	266	-	19	0	11	-	3	8/17
94	**3440**	-	60	2360	1020	40	47	20	30	6	6	7/21
99	**3800**	20	320	2820	660	140	23	2	17	8	9	8/20
04	**4280**	-	120	3660	500	440	39	4	12	7	7	8/19
Atriplex canescens												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	19/20
99	**0**	-	-	-	-	-	0	0	-	-	0	28/35
04	**0**	-	-	-	-	-	0	0	-	-	0	21/26
Cercocarpus montanus												
88	**232**	1166	66	133	33	-	0	0	14	9	14	45/47
94	**540**	-	120	400	20	20	56	15	4	-	0	52/64
99	**620**	60	300	280	40	20	35	6	6	-	0	59/67
04	**720**	20	340	360	20	-	11	56	3	-	0	55/74
Chrysothamnus nauseosus												
88	**0**	-	-	-	-	-	0	0	0	-	0	-/-
94	**40**	-	-	20	20	-	50	50	50	50	50	11/13
99	**0**	-	-	-	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus viscidiflorus												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	100	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	9/11
Ephedra viridis												
88	**832**	100	166	433	233	-	4	8	28	-	4	27/22
94	**340**	20	20	280	40	-	18	12	12	6	6	34/43
99	**340**	-	40	240	60	-	53	12	18	-	0	39/46
04	**500**	-	20	420	60	20	32	4	12	4	4	40/49
Eriogonum microthecum												
88	**966**	66	133	800	33	-	0	0	3	-	0	2/2
94	**580**	-	20	540	20	-	3	14	3	3	3	1/3
99	**540**	20	200	320	20	-	19	7	4	-	0	2/4
04	**600**	-	80	520	-	-	43	10	0	-	0	2/3
Gutierrezia sarothrae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	-/-
Juniperus osteosperma												
88	**199**	33	166	33	-	-	0	0	-	-	0	63/41
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	-	140	20	-	20	0	0	-	-	0	-/-
04	**160**	20	80	80	-	-	0	0	-	-	0	-/-
Opuntia polyacantha												
88	**399**	-	133	233	33	-	0	0	8	5	8	2/5
94	**80**	-	-	60	20	-	0	0	25	-	0	3/13
99	**80**	-	20	60	-	-	0	0	0	-	0	3/12
04	**60**	-	-	60	-	20	0	0	0	-	0	3/10
Pinus edulis												
88	**399**	166	333	66	-	-	0	0	-	-	8	44/52
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**260**	40	140	120	-	20	0	0	-	-	0	-/-
04	**220**	-	80	140	-	20	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Yucca harrimaniae												
88	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	9/12